Naval Health Research Center *San Diego, CA*

NHRC UPDATE

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This update is published quarterly to highlight NHRC contributions to the Navy and Marine Corps as well as the scientific community.

NHRC Scientists Lead Epidemiological Research on Gulf War Veterans

The health of the veterans who served in the Gulf War has been a matter of intense public interest and of great concern to health care providers and planners at the Department of Defense and the

Department of Veterans Affairs. In the Spring of 1994, the Assistant Secretary of Defense for Health Affairs tasked the Naval Health Research Center to develop comprehensive epidemiologic studies among Gulf War veterans. In response to this tasking, Captain (select) Greg Gray, a Navy physician and epidemiologist, assembled a strong multi-disciplinary team at NHRC and established effective research partnerships with eminent scientists at the University of California, San Diego; the Walter Reed Army Institute of Research; the Centers for Disease Control and the Department of Veterans Affairs.

In a study recently published in the *New England Journal of Medicine*, Dr. Gray and his colleagues examined the hospitalizations of 1.1 million veterans. The researchers looked at a broad spectrum of diagnosis from August 1991 until September 1993. Screening the 487,549 hospitalizations which occurred during this 2-year period, the team found that the 547,076 Gulf War veterans had the same postwar overall hospitalization experience as their 618,333 nondeployed peers of the same era.

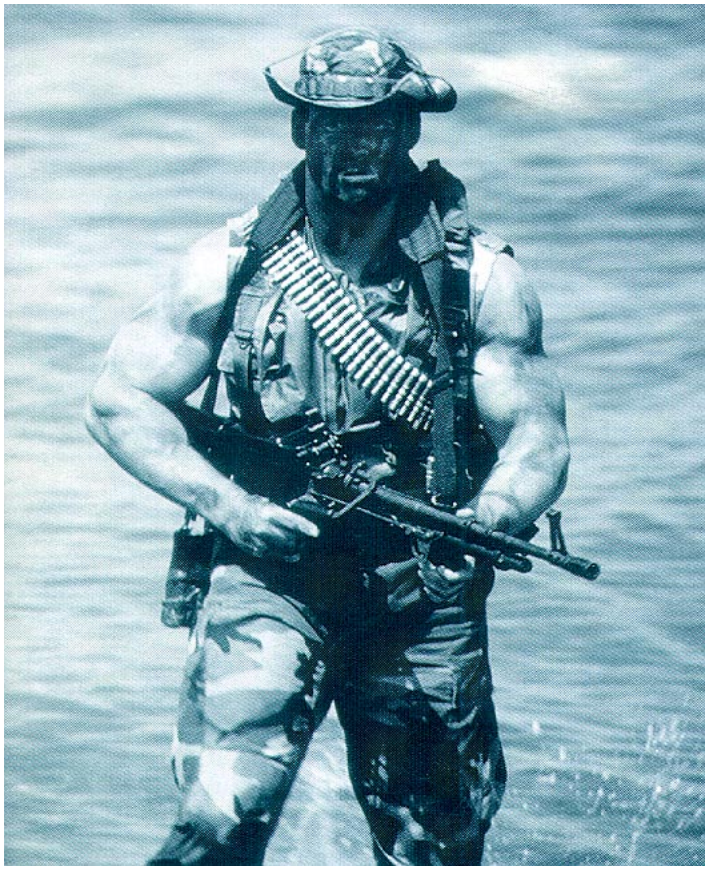
Differences in hospitalization experience for specific diagnostic categories were found between the two populations, but these differences were consistent with research findings from other wars and attributed to other reasons. The results of the study suggested that after the war, there was no increased risk of "any cause" hospitalization among Gulf War veterans compared with nondeployed veterans. Gulf War veterans had a different risk of hospitalization than did nondeployed veterans in 16 of 42 diagnostic category comparisons. In four of these 16 different comparisons, Gulf War veterans were at increased risk: neoplasms during 1991 (largely benign), diseases of the genitourinary system during 1992, diseases of the blood and blood-forming organs during 1992 (mostly anemias), and mental disorders during 1992 and 1993. These differences were not consistent over time and could be explained by deferred care, postwar pregnancies, and postwar stress.

This work is one of the first large-scale studies to compare health outcomes among Gulf War veterans with appropriate comparison groups of other active duty personnel. According to Dr. Gray, additional NHRC

studies which have been strongly endorsed by the Institute of Medicine, will focus upon symptoms, reproductive health, and hospitalizations among various groups of Gulf War veterans. One such study will compare hospitalizations among Gulf War veterans who may have been exposed to the destruction of Iraq's Khamisiyah ammunition dump in March 1991.

NHRC Physiologists Develop Methods to Sustain Physical Performance of Special Operations Personnel

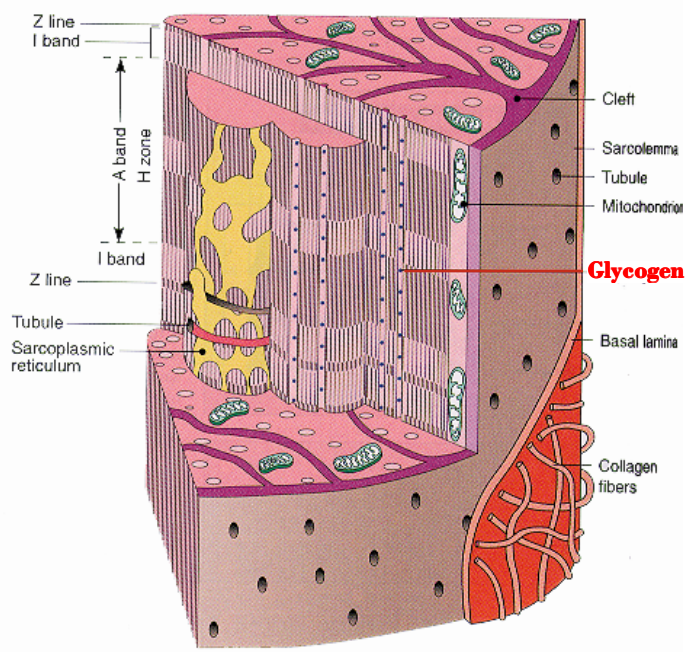
Special forces operators (SEALs, Force Recons, ANGLICO, etc.) often perform physically demanding tasks at the limits of human endurance to achieve mission success. Their primary



missions, which are clandestine and performed by small units, include 1) beach surveys in support of amphibious operations, 2) reconnaissance and intelligence gathering, 3) rescue of downed pilots and extraction of personnel from denied territory, 4) limpet (ordinance) attacks against enemy ships and piers, and 5) direct actions against military targets on shore or at sea. NHRC researchers have been studying special operations mission requirements for several years and have identified a number of methods and techniques to enhance or sustain physical performance under extreme environmental conditions.

The NHRC Special Operations Division, composed of exercise physiologists, exercise biochemists, nutritionists, and statisticians, works with the special forces community on a daily basis to study the efficacy of physical training, nutritional and ergogenic interventions. Nutritional strategies include carbohydrate loading and supplementation, creatine supplementation, and hyperhydration. Guidelines for applying these interventions have been published and distributed to special operations commanders and medical officers.

Carbohydrate loading, a method used to increase muscle glycogen to abnormally high levels



Source: *Exercise Physiology.* Mcardle, Katch & Katch (Eds.) Williams & Wilkins, 1996

Glycogen storage within the muscle fiber

(supercompensation), is a common practice among endurance athletes. This increases the time that an athlete can maintain a given power output and thus extends his/her exercise endurance time. Carbohydrate loading also has potential to sustain physical performance during special operations missions; however, unlike athletic events military operations may

be delayed for several days, and the glycogen levels may return to normal before the mission. In a recent study published in the *Journal of Applied Physiology*, Dr. Goforth and his colleagues found that supercompensated muscle glycogen can persist in special forces personnel for at least 3 days if physical activity is limited. This indicates that carbohydrate loading has sufficient flexibility for use by special operations personnel in an operational setting even if the mission is delayed. Armed with this information, the NHRC team is now working with colleagues at the Yale University Medical Center using Nuclear Magnetic Spectroscopy to test two modified carbohydrate loading procedures. In contrast to the previous study, these protocols include daily exercise and are designed to achieve and maintain muscle glycogen supercompensation and fitness for 3-6 days.

The NHRC researchers are also working with special operations personnel to evaluate physical training techniques, which involve eccentric training (downhill running) to toughen muscles and reduce muscle soreness, and short-term, high intensity cycle exercise to simultaneously increase aerobic and anaerobic capacities. These studies are being conducted in collaboration with researchers from the Canadian Defense and Civil Institute of Environmental Medicine; Northern Arizona University; University of California at Los Angeles, and Yale University. Our close proximity to the Navy and Marine Corps special forces provides NHRC researchers the ability to fully understand mission requirements, execute high tempo field research activities, and effectively transition biomedical technologies and interventions to these highly specialized communities.

NHRC Researchers Explore the Cycle of Domestic Violence

Violence directed toward an intimate partner or a child is an issue of great national concern and is an area of special interest within the Bureau of Naval Personnel (BuPers). As part of a broad set of initiatives to prevent and treat domestic violence in the Navy, BuPers has tasked NHRC researchers to identify factors associated with domestic violence, including the view that childhood experiences in the family of origin may contribute to the risk of child abuse during adulthood. In a study recently published in the journal of *Child Abuse & Neglect*, Dr. Lex Merrill and his colleagues, including Ms. Linda Hervig at NHRC and Dr. Joel Milner at Northern Illinois University surveyed 3,776 female and male recruits to determine their histories of physical abuse, alcohol misuse, and their potential for child abuse.

The results of the study showed that 31% of the female and 20% of the male recruits witnessed parental violence and about 40% of all recruits experienced at least one instance of childhood physical abuse. The study also found that a pattern of violence in women, such as receiving physical abuse as a child or inflicting physical violence on an intimate partner, increased the risk of child physical abuse. Being a victim of child abuse also increased the potential for child abuse among men. A history of alcohol misuse was also a predictor of intimate partner abuse and injury, as well as the potential for child abuse.

Navy recruits at RTC, Great Lakes

NHRC researchers are currently extending these findings through a 4-year longitudinal study in conjunction with Northern Illinois University and in collaboration with researchers at the University of Southern California, University of Arizona, and the University of North Carolina. This study, which is being supported by the Navy Family Advocacy Program in the Bureau of Naval Personnel, will determine the impact of premilitary maltreatment histories on the careers of Navy personnel, long-term health care consequences, and the risk for revictimization and recidivism. Results from this research will assist the Bureau of Naval Personnel in its proactive approach to the prevention and management of domestic violence.

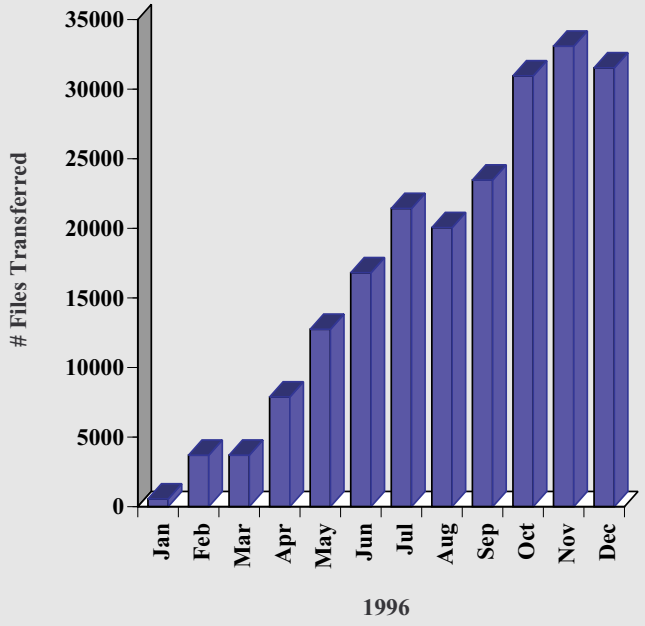
N091 and ONR Essential to Biomedical Fleet Support

About one-half of the research programs at the Naval Health Research Center are supported by the Director of Navy Test & Evaluation & Technology Requirements (N091) and are executed through the Office of Naval Research. With input from the Navy and Marine Corps operational commanders, N091 establishes our research requirements and provides fiscal support. As the execution sponsor, the Office of Naval Research manages the resources, maintains high standards of quality, and ensures the development and integration of research findings and technologies from both the private and public sectors.

The remaining one-half of our research programs are supported directly by our operational customers, which include the Navy, Marine Corps, Army, and Department of Defense. Each of our research programs is managed through the Naval Medical Research and Development Command, our parent command, which provides administrative support, and program guidance and oversight. We are deeply indebted to each of these organizations for their critical roles in helping NHRC support our operational forces through biomedical research and development.

NHRC World Wide Web Site

The NHRC home page was developed to provide on-line access to information about the Naval Health Research Center. A cyberstroll through this website provides hyperlink access to organizational overviews, current research programs, publication abstracts, administrative information, copies of the NHRC "Update", links to other important websites, and even the 5-day weather forecast and visitor information for San Diego. Over 1,000 people per day from 50 different countries are currently visiting our site to learn more about our Navy and Marine Corps research in operational epidemiology, medical operations research, medical and performance modeling, operational performance assessment and enhancement, medical informatics, health promotion, and readiness standards. We hope to see you soon.



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